The MAC Flyer

MARCH 1973

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For Greater Efficiency
in MAC Air Operations

The MAC Flyer

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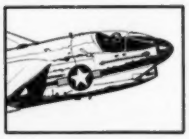

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COVER: A combination of the mission and versatility of the chopper sometimes leads a pilot to self-destruction. Photos by G. M. Rouff.

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Squawk Box

"We try harder because we're number two." This slogan, made famous by an auto rental firm, proclaimed that the managers had taken a hard look at the competition and decided that they could do better.

Is there a parallel situation in MAC? After all, we're all alone in our class — so obviously, we're number one. But, to borrow a SEA phrase, we can also be **number ten** — all it takes is a little resting on our laurels.

Unlike the auto firm, our competition is internal. When we opt for the easy way out, we lose the number one spot by default. Consider these common options:

★ Study the Dash One, or watch TV?

★ Jog around the block, or have another brew?

★ Verify the station, or chat with the other pilot?

★ Brief the passengers, or ignore them?

★ Read the FCIF, or skim it and initial the card?

★ Dig out the approach plate, or fly from memory?

You get the idea. In some cases, we merely put off the inevitable — and feel a bit guilty for procrastinating. In others, our luck holds and we get by — feeling we've saved a lot of time by avoiding the unnecessary. But then there's the time when things start to turn wormy and rotten — thanks to us.

It's a great life for number one, and number two can take pride in progress from honest effort. But then there's number ten.

What's your number?

Helicide: the end result of a lapse in judgment.

To Kill A Chopper Pilot

by Arnold R. Lambert, Directorate for Education and Prevention, USAAAVS

Wire strikes, low altitude autorotations, and collisions with the ground, water, or trees all too often result from unwarranted low-level helicopter flying. The following article, which appeared in the December 1972 issue of *U. S. Army Aviation Digest*, is reprinted here in hopes that the consequences of following *desire* will come to mind and will *strengthen your self-discipline* and *judgment* the next time you feel an urge to take a close look at the terrain from an airborne helo.

Too many routine missions have ended in senseless and tragic accidents because a flier was programmed to self-destruct. The programming is done by the pilot himself when he submits to an overwhelming desire to demonstrate his low-level flying skills or show what his machine can do.

A pilot can be trained and his flying skills honed to a razor's edge, but to train him in self-discipline is almost impossible. This he must do himself. It's human nature to pit desire against better judgment and knowledge. When a desire is strong, we tend to seek justification in favor of the desire and against good judgment. When this happens to a pilot, self-discipline is crowded out and the programming is completed for a potential accident.

* * *

Here is an account of an accident in which the pilot had been flying unnecessarily low, circling a house.

Just prior to the accident, one of the last things he said was:

"This Is Where She Lives"

The UH-1 engine failed and the aircraft crashed into a city street and was destroyed. Three of the four crewmembers sustained major injuries. The reason for the engine failure was traced to an unsecured fuel line quick-disconnect which resulted in fuel starvation.

The helicopter was en route from an airfield to a pad on the other side of the city. The accident investigation board recorded the following:

Question: What was your altitude?

Copilot: We were flying at 150 feet.

Question: Did the pilot say anything to the copilot?

Crew chief: He said something like, "This is where she lives."

Question: What can you tell us about the accident?

NCO club manager: On numerous occasions in the preceding week, I had noticed a helicopter of the same type circling over the club area toward the center of the business district. It was extremely low over the club and seemed to go even lower as it went toward town. On the morning of the accident, a helicopter of the same type made two swings over the club. As it seemed to near the lowest point in its normal low orbit, I heard two loud crackling sounds and then silence.

This appears to have been a maintenance-induced materiel failure and at a reasonable altitude, normal emergency procedures would probably have gotten the aircraft safely to the ground. The pilot was apparently in a habit of trying to impress a girl friend by buzzing her house.

* * *

During the investigation of a similar accident, the board recorded the following statement from the crew chief:

"I Believe He Was Going to Fly Over Her House."

An OH-23G, with a pilot and crew chief aboard, took off for an administrative flight. Approximately 10 to 15 minutes later, the helicopter was turned to a westerly heading, approximately 75 feet above the ground. It then flew between two

ridges and was approximately 20 feet above the ridgetops maintaining level flight for approximately 200 yards, when it struck three 1/8-inch steel telephone wires spanning the ridgelines.

The wires contacted the collective pitch control rod, cyclic control rods and transmission case. The wires then became entangled around the 5-inch drive, 1-inch drive shaft, tail boom, tail rotor, and tail rotor gearbox. The tail rotor pitch control cable was broken.

Four hundred feet from the initial strike, the main rotor blade cut eight additional powerlines, then struck the face of a building 12 feet from the ground, breaking the mast. The wreckage came to rest approximately 10 feet inside the building, lying on its left side. The pilot received minor injuries and the crew chief received major injuries.

Low level flight was not necessary for this mission. If the pilot had been at a reasonable altitude, the wire strike would not have occurred.

* * *

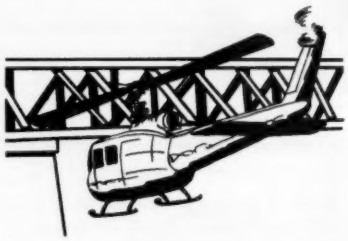
Misplaced Confidence

Consider the following case of a UH-1H pilot who had a total of 540 flying hours. With a copilot, crew chief, gunner, and passenger aboard, he was flying one of two helicopters which had completed their mission, refueled, and were flying along a river when they came to a railroad bridge. One of the last things he heard from his number two man was,

"No, I'm Too Short."

AC of trailing UH-1H: " . . . We both low-leveled down the river. I was taking photographs and my pilot was at the controls. As we approached the railroad bridge, the pilot of the lead ship called on UHF, said he was going to fly under the bridge and asked if I would follow. I replied. 'No, I'm too short'.

"As we closed on the bridge, I had my pilot drop back to give the pilot of the lead ship room to climb over the bridge, as I did not think he would try to go under. As he got to the bridge and passed the critical point, we began a climb over the bridge. The lead pilot appeared to begin a flare and cyclic turn as he got to the low bridge. His turn was apparently started first and his flare about half completed when the main rotor hit the bridge and shattered. At this point, the aircraft hurtled forward and we lost sight of it as my aircraft crossed over the bridge at 100-200 feet.



"Reaching the far side of the bridge, I saw the aircraft lying on its top right quarter with a small fire in the hellhole. I took control, made a tight 270-degree turn, and landed just as the crew chief jumped from the wrecked aircraft and a minor explosion started a fire over the whole rear half of the wreckage . . ."

The pilot and gunner were killed in the impact and fire, and the copilot had several broken bones and serious burn injuries. The crew chief and passenger escaped with minor injuries, and the helicopter was a total loss.

Questions asked crew chief: "Did you hear any transmission from either of the pilots in the aircraft following you, attempting to discourage your pilot from flying under the bridge?"

"No, just the transmission about being too short to try it."

"Have you ever heard of anyone attempting to fly under this bridge?"

"I had heard that four aircraft had gone under the same bridge before, but I don't know whether they were from this unit or not. I had flown under the same bridge with the pilot about three weeks before the accident."

Flight surgeon: ". . . Any pilot who attempts to fly under a bridge just to show he can do it demonstrates a definite lack of maturity and professionalism."

The pilot of the trailing UH-1H used good judgment in choosing not to play follow the leader. The pilot of the lead UH-1H had apparently flown under the bridge in previous occasions and was overconfident.

* * *

Senseless and Tragic

A UH-1H aircraft commander was flying number three in a loose trail formation of four. As they flew across the water, the AC saw a destroyer in the bay. He veered to the right and descended to an altitude of 1 to 5 feet above the water. The crew chief and door gunner opened the cargo doors and the helicopter was flown from the bow to the stern of the destroyer parallel to the port side.

Reaching the stern of the ship, the AC made a cyclic climb to approximately 200 feet. He decreased airspeed to about 40 knots at the top of the climb and made a sharp left turn. He then began a dive, with his flight path parallel to the starboard side of the destroyer. During descent, airspeed increased to approximately 100 knots and the AC and pilot were unable to recover from the descent. The helicopter hit the water with skids level and fire and explosion resulted.

The AC and pilot escaped from the submerged helicopter and were rescued by a boat from the destroyer. Both sustained major injuries. The crew chief's body was recovered four days later, and the gunner's body was never found.

Both the AC and pilot demonstrated a lack of discipline by buzzing the destroyer, by varying the

flight route from their predetermined course, and by attempting an unauthorized maneuver.

* * *

"To Break the Monotony"

A UH-1H with four crewmembers and five passengers aboard was on a liaison mission. "To break the monotony," the AC flew low level, about 50 feet, down a river. A passenger spotted some figures with weapons, and the AC turned the aircraft around to investigate. He climbed to 250 feet, made a sharp left turn, entered a dive, and struck the water in a nose-low attitude at an airspeed of 60 to 80 knots with engine rpm deteriorating below 6,200.

The aircraft, crew chief, gunner, and three passengers were not recovered. The pilot and one passenger sustained major injuries, and the AC and one passenger had minor injuries.

Question asked by accident investigation board: "Why did you decide to fly low level?"

AC: "To break the monotony."

* * *

Etiology of a Mid-Air Collision

The day had been long and tiring. The flight leader called the tower on the way home and requested permission for a flyby. Always good for morale, he thought. The five slicks locked in echelon right. Before reaching the end of the runway, Chuck 4 collided with Chuck 3. The results included four fatalities and two postcrash fires.

One of the major factors was an attitude of overconfidence, with subsequent carelessness on the part of the pilot of Chuck 4. He was one of the most experienced pilots in the unit, with more than 1,500 hours in helicopters and 1,336 hours during his current 11-month tour. He had been averaging more than 120 hours monthly and had no previous accidents. After considerable discussion with him and his fellow aviators, it became obvious he considered himself exceptionally capable and undoubtedly took great pride in his flying record and prowess. His platoon leaders and others had noted he was rather resistant to suggestions regarding his flying techniques and habits. He had been admonished on several occasions that he was flying too close during formation flights. On the day of the accident, he had been told twice, once earlier in the day and again just prior to the accident, that he was flying unusually close. It would seem his overconfident attitude allowed him to become careless about keeping his proper distance between helicopters.

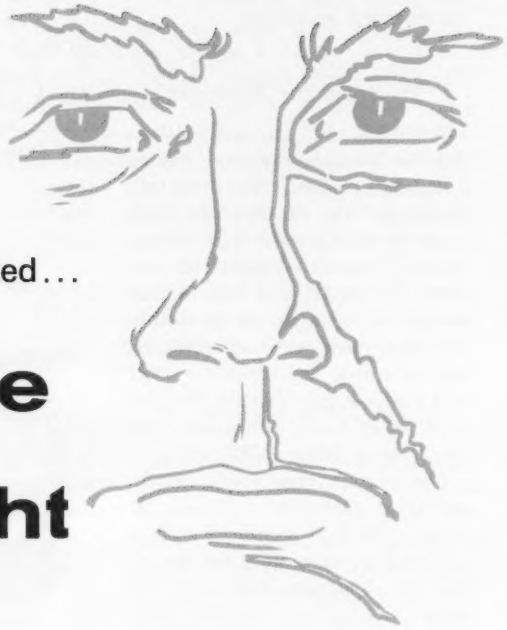
The esprit of the unit was high and the encouragement of the flight leader to "close it up and look real good" probably caused the pilots to form a tighter formation than usual. In fact, most of the crewmembers interviewed remarked that it was one of the tightest formations they had experienced.

* * *

In each of the above accidents, the pilot had a desire to impress someone by demonstrating his flying skills. In each case, however, what the pilot really demonstrated was lack of professionalism, lack of self-discipline, lack of good judgment, and immaturity.

Although the pilot is ultimately responsible for his aircraft, several of these accidents point vividly to a breakdown in supervision. When a pilot has a habit of flying low, has previously flown under a bridge, or has been known to fly too close in formation, definite action must be taken. Not only do commanders, operations officers, flight leaders, flight examiners,and instructors have supervisory responsibilities but other pilots, copilots, and crewmembers have a moral obligation to thwart unauthorized, careless, and reckless maneuvers.

Unfortunately, the rest of the crew can't get out and walk when the pilot programs himself for destruction. All too often the crew pays for the pilot's poor judgment. When a pilot causes the death of a crewman because he rules in favor of a childish desire to demonstrate his flying skill, what does he think about when he looks at himself in the mirror? Ask yourself that question the next time you want to impress someone with your flying skill. Demonstrate your flying ability by making certain your crew and aircraft arrive safely after each mission. That takes professional skill.



Read one man's reaction to being booted...

Out to Pasture at Twenty-Eight

by Tom Paton

TWENTY-EIGHT YEARS OLD. Senior pilot rating just around the corner, flying skills better than ever — and it's time to retire. At least that's what the Department of the Air Force seems to tell you. The call from Randolph went something like: "That's right, Lance, you've got your five years in the cockpit and we need you for that staff job at Ramstein Air Base." The first thought was *Germany!* Great! Fabulous!

But then it really hit you. Retire? No more flying for the ace pilot? (Sure, you'll still get airborne—but who counts driving the base T-39 for annual minimums when you've flown 70-120 hours a month for the last five years.) A hundred thousand bucks to train you to yank and bank (or was it bank and yank?) and now they're telling you it's time to learn the hallowed arts of pencil pushing and paper shuffling? They can't do it! You *love* flying!

But wait a minute. Maybe it *is* time that you learned something besides how to drive a bus with wings on it. Yes, maybe you'd better assume the duties of an officer and become a planner and director instead of just a doer. Besides, after three years of battling those ACPs, isn't it about time you gave them a break and disappeared from their inbound TWX box? Yeah — maybe so.

But what about all that flying you've done? Doesn't that count for anything? Yeah, Lance. What about that?

Pilot training was great. Never a star in academics, but you were a great stick. No hairy experiences while solo (although you secretly desired to dead stick the Tweet onto one of those Oklahoma section roads from a dual engine flameout, but fate never gave you a chance). But one truly vivid thing stood out in your mind. Reading those flying safety magazines in the flight-line latrine certainly made an impression. All those pilot-error accidents! And there you and your classmates were — sage veterans with 75 hours of flying time in the T-37 phase and all was going fine. Student accidents in ATC were few and far between, a great record.

Then came the start of the real test. They gave you that 120 knot machine — your first bus — a 5,000-pound ACL with at least 5,000 different cargoes. Yes, Lance, that's when you started to learn what the flying game was all about.

You loved the Caribou. Anybody who's flown it into a 900 foot airstrip loves it. But what a beast! So slow. How did you ever survive 1,000 flying hours in the combat zone? Yeah, Lance, how did you?

First of all, the thing you hated the most (well, second to being called the new guy until the next 1505-clad green head showed up with a bewildered look on his face) was all those conversations with the field grade types at the bar who said, "You just don't have any

experience." Or maybe the old head who said, "Given the choice, I'll take *experience* before I'll take anything else when I want a new AC." Yes, about 350 nights at the bar arguing with those guys and swapping war stories certainly took up more than a few minutes of your time. But Lance, what about those *specific* things, those things that you did (or saw done) correctly when it counted and those things you did (or saw done) that were wrong or just plain dumb plays?

Well, how about the guy who used to drink within his twelve hours of a mission? Didn't he finally ding an airplane? And what about those low passes you made — you know, "Just to show the grunts you love 'em." They were really impressed, weren't they? *You* got away with it, but how about that C-123 driver down at Rach Gia? That wreckage was almost covered by the underbrush when you rotated. And how about that C-130 copilot who didn't check the final approach and told the AC it was clear to take the runway at that isolated airstrip? The burning Ranch Hand C-123 *on short final* then had to land in the rice paddy instead of on the runway.

War stories, yeah. True, yeah. But how about a little pertinence for your fans, Lance? After all, 4,000 hours is a lot of flying. What's your secret to success? Didn't you write your Ten Rules of Flying Safety just recently? They are for C-141 operations, but don't they really apply to all flying? Let's check them:

Rule 1. *Know your limitations and accept them.* Physically and mentally. Don't push yourself or your crew beyond *any* limitations. Not *ever.*

Rule 2. *Get those individuals thinking together as a crew.* Start from the first briefing. Respect with dignity those enlisted men. Treat them as you'd want to be treated if you were the loadmaster or flight engineer. Remember, one man pulling against you could set up the circumstances that trigger an accident.

Rule 3. *When facing a problem, ask yourself, "What would the squadron commander do if he were in my shoes?"* Would he press on? Would he drop back fifteen and punt? Or would he stand here and argue about this 781 writeup and refuse to fly the plane? Remember, you're an extension of the squadron commander — his representative — when you're on those missions 10,000 miles from home.

Rule 4. *Read those publications thoroughly and often.* How many crewmembers study hard just before a scheduled check ride and then don't open a book for three months? Too many. Know those books and, when the pressure is on, it'll be 90 percent easier to handle that emergency.

Rule 5. *When the emergency occurs, stop and think, then act.* Too many people have feathered the wrong propeller or shut down the wrong system in haste.

Rule. 6. *Do all the hangar flying you can.* There's a wealth of information among the "old heads" and the guys who have "been there before." Ask flight examiners questions after their questioning sessions are completed. Bend their ears at the bar. Talk among your own crew. There are few people who don't like to tell war stories to their peers. Most men are flattered when you ask them to tell you what they did under hairy circumstances or emergency conditions that enabled them to successfully save themselves, their crew, or their airplane.

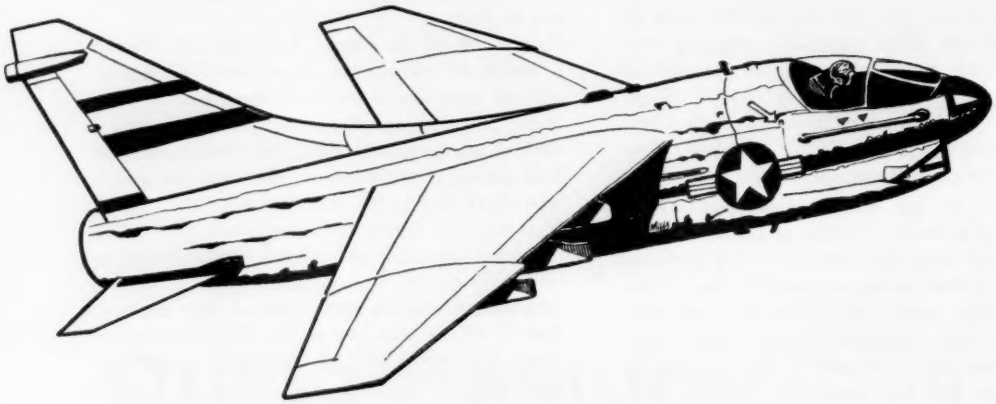
Rule 7. *Flight plan thoroughly.* Too many pilots figure that, since the C-141 is virtually trouble-free and "just like airline flying," all you do is get a weather forecast, check the notams, and file the flight plan. But what *does* "TT180" mean in the IFR Supplement? And what about all those other "small things" you never bother to look at; MOCA, for instance?

Rule 8. *Read those safety publications. The MAC Flyer, Aerospace Safety,* USAF Accident Summary, and others contain a wealth of material. They're published for our benefit, and they prove just how concerned the Air Force is about the safety business.

Rule 9. *When in doubt, go around.* For some reason, we in the C-141s figure that when we're out in the system everything is a *full stop* landing. We get used to putting down on the runway at the end of an eight-hour flight and that's that. But it's *not.* A go-around or a touch-and-go is *cheap* compared to a long landing or a poor approach in the weather. There's no stigma attached to a go-around.

Rule 10. *Never assume anything.* Like, for instance, you never heard of a '141 making a gear-up landing, but how many have landed without running the Before Landing Checklist? More than we'd like to think of. A C-133 made a gear-up landing just a few years ago. Could it happen to us?

Well, that's about it. There are other rules, but we talk about them more often than we talk about these. Yes, Lance, you certainly are going to miss that line flying and that local pattern. But then, you've learned a lot and will be in a good position to put your knowledge to use helping others. After all, it's not everyone who gets to retire at twenty-eight. Besides, Lance, this could be temporary, so don't close the door on the possibility that you will again exercise these rules for more than the 60-1 minimums each month.



Airspace congestion, mixed VFR-IFR traffic, ATC mix-ups, heads in the cockpit—four causes of mid-air collisions.

The Ultimate

by Maj Gus Arellano
MAC/IGYF

Two recent midair collisions have highlighted the ever growing problem of air traffic congestion. While the aircraft involved in the most recent accidents were assigned to other commands, MAC has not been completely free from this problem. MAC aircraft have been involved in several near-misses and in one actual mid-air collision in the past year and a half. THE MAC FLYER invites you to take a look at three MAC mishaps and to analyze the circumstances which created the problem.

Case One: "Never Saw Him" A B-57 on a local training mission, flying under visual flight rules, collided with a civilian light aircraft, also VFR, in the traffic pattern. The B-57 fortunately sustained only minor damage and recovered safely, but the Cessna 150 crashed, killing both pilots. Weather was not a factor. The B-57 pilots were at traffic pattern altitude doing their thing, and were never advised of nor did they see the light aircraft. The Cessna received two traffic advisories regarding the B-57 but each time the pilots were unable to see the B-57. Several minutes prior to the collision the Cessna had reported operating 500 feet below jet traffic pattern altitude but either climbed after that or had altimeter problems.

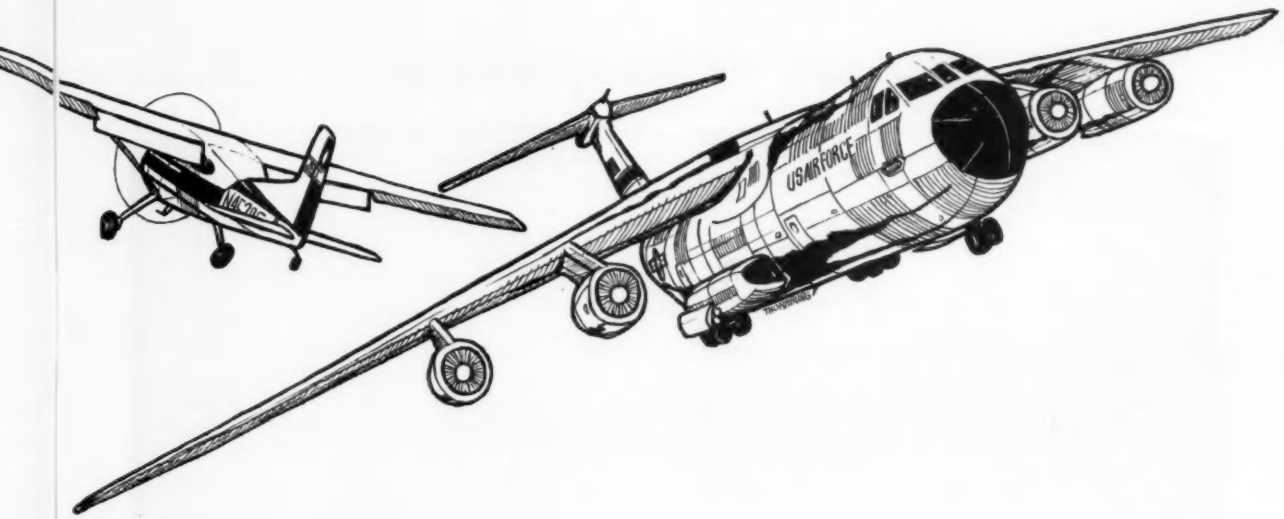
Case Two: "Scary but True" A C-141 at FL 330, IFR on airways, experienced a near miss with a civilian air carrier. The Starlifter had been flying in cirrus clouds and had received traffic advisories. Just as the C-141 entered a clear area, the crew spotted the airliner on a collision course and took immediate evasive action, missing the other aircraft by an estimated 60 feet. No damage or injuries on this one; just a few more gray hairs and maybe a new flight suit or two.

Case Three: "There I was at 4,000 feet" A C-141 was holding in VFR conditions, under an IFR clearance, when a flight of three fighters passed dangerously close. The fighters were on a VFR clearance even though they were flying in a highly congested area.

All aircraft involved had operable transponders set to the proper codes, but the radar controller either did not see the VFR traffic or did not have time to offer traffic advisories.

* * *

The circumstances surrounding these three cases are different, but all three have one important factor



in Air Pollution

in common — the pilots' eyes were the only positive tool available to avoid collisions.

The factors contributing to the collision in case one are many but the outstanding fact remains that the pilots of the two aircraft, flying VFR, just did not see each other.

Case two is frightening since we expect positive separation from other IFR traffic, and we sometimes relax our outside vigilance at altitude. This case, however, is only one of three reported occurrences this past year where MAC aircraft had to take evasive action to avoid other aircraft at high altitude. One incident happened over Europe, one in uncontrolled airspace in the South Atlantic, and one over the US.

Case three is typical of the most common situation and poses the greatest hazard, simply because exposure is the greatest. A MAC aircraft on an IFR clearance in VFR weather, mixing it up with VFR traffic.

But don't despair, all is not lost. There are defensive measures and precautions. The following actions can be taken to minimize the problem:

1. Make maximum use of IFR procedures and facilities.

2. Encourage the use of VFR radar advisory services by aircraft that must fly VFR. Stage II or Stage III radar service is now available at all MAC bases and at many other military and civilian airfields. (Aero club aircraft should certainly use radar service when available.)

3. Training missions should be planned in such a way as to allow outside vigilance by at least one pilot. On aircraft with a jump seat, the occupant of this seat should be used to clear outside.

4. Radar vectors can be used to avoid reported traffic; however, these vectors must normally be requested by the pilot and are furnished only if the controller's workload permits it.

5. Local training areas and especially low-level training routes should be well publicized among area light-plane operators so our civilian friends know where they might expect military traffic.

6. Above all, keep your eyes out of the cockpit. Countless collisions have been avoided through vigilance.

Until the day arrives when we are guaranteed positive separation from other aircraft, we will have to maintain the outside vigilance necessary to provide ourselves the proper separation. Encourage the use of the autopilot, extra scanners, and an unrelenting crosscheck outside the airplane to ensure survivability.

For FEs, IPs, and Upgrade ACs Only:

A TALE OF TWO TRAINING FLIGHTS

(adapted from Approach)

The IP, a weekend warrior, was assigned to give the operations officer his last syllabus flight prior to a check ride. The IP's credentials were impeccable. He was an airline captain and he had "many thousands" of hours in the squadron's airplanes. He knew the ops officer well and knew that he was eager to be an AC. The syllabus called for the last instructional flight to be a 3-hour review; it would be a stiff workout for the pilot being upgraded.

The IP walked into the squadron office and said, "Good morning, Harry, I'd like to review your training record before we brief. I'll be in the crew lounge if you want me." An hour later he reappeared and asked the ops officer if he was ready to go.

The IP then suggested that they find a quiet spot where they could discuss the forthcoming flight without interruptions. He set the stage for the flight with a monologue that went something like this:

"Harry, on this flight I want you to assume that I'm a reasonably intelligent copilot. Use me, but I'm not going to volunteer to do anything unless you ask or direct. I will not give you any compound emergencies that will compromise a safe flight, but you can expect plenty of simulated emergencies — engines, instruments, navaids, electrical, hydraulic, and problems with crew and passengers.

"If we have a real emergency or a real system malfunction of any kind I'll expect you to handle it, but I'm available for suggestions or ideas if you want to talk it over. I will not intentionally mistune any frequencies. When we do basic airwork, take your time. All turns will be standard unless I ask you for steep turns; in which case I want not less or more than 45 degrees. In holding patterns and on approaches I want you to be as precise as you can. When you taxi I want you to assume there's a little old lady in the back of the cabin, and we wouldn't want to throw her around. Any questions?"

The two pilots then engaged in a lengthy series of questions and answers. Finally, they proceeded to the airplane, looked over the 781 write-ups for the past several flights and then began preflight. During the preflight the IP asked the ops officer many questions concerning the aircraft's systems.

The two then inspected the interior of the aircraft as thoroughly as they had the exterior. The IP asked questions about weight and balance, cargo loads, emergency lighting, escape routes, cabin integrity, and crew briefings. He left nothing uncovered. The flight engineer was briefed, and the purpose of the flight carefully explained. The checklists were then precisely followed and the engines started. After clearance was received, the ops officer taxied out.

The ops officer expected an emergency on takeoff and he wasn't disappointed. Right after decision speed, the IP called out, "What course of action would you take if you had an overheat on number one engine?" The pilot continued his takeoff and talked through the steps of handling the problem.

During the climb, ATC came in with an altitude restriction and holding instructions at an intersection about 15 miles away. Departing holding, the ops officer was advised that number two engine oil pressure was fluctuating and to assume the engine would fail. The ops officer asked for the checklist and number two engine was simulated shut down. He then simulated a call to center advising of their plight and intentions.

The IP next requested ATC for clearance of airways for airwork, and then gave the ops officer a real workout with turns, climbs, descents, one engine out, two engines out on one side, unusual attitudes, aircraft clean, aircraft dirty — the whole bag. Finally, the pilot asked the IP to fly the plane while he took a breather. At this point ATC was called for clearance and flight was resumed toward their destination. As the ops officer again took control, center handed them off to approach. The IP instructed the pilot to assume number two engine was out as he retarded the power to idle. The before-landing checklist was covered and all was well except the gear didn't lower.

The pilot directed that the hydraulic pump selector, gear handle, and circuit breakers be checked. The gear dropped.

Just when he thought he had it made, he noted the off flag showing on the ILS indicator; however, he had already tuned in the outer marker on the ADF, and he announced that they would discontinue the ILS and proceed on an ADF approach. He directed the IP to advise him of the new minimums and to call off 100 feet above minimums for an ADF approach. The remainder of the approach and landing was uneventful, as were several ensuing practice approaches and cross-wind landings and takeoffs.

The flight back to their home base was similar to the outbound leg — with more emergencies — all being properly handled by the ops officer. At homeplate he satisfactorily demonstrated three GCAs and was told to head for the chocks. Later that week the ops officer's check ride proved to be a piece of cake in comparison to the "instruction" he had received from the IP.

Here were two pros in action. The IP took the time to review the background and training folder of the pilot under instruction. He covered in their briefing, in detail, what they would do and how it was to be done. At no time was safety of flight compromised. Real emergencies were covered, as well as simulated emergencies.The IP indicated the type of performance he expected. The pilot was alerted beforehand and was equal to all occasions. Although he worked harder in the three hours than anyone would expect to on any scheduled flight, he demonstrated that he knew his plane and procedures, and was ready to be designated an AC.

Contrast that flight, which ac-

tually occurred, to this one — equally true.

* * *

The Convair training flight was set up for a 0630 show and a 0830 go. Two days earlier the same mission, with the same three upgrade pilots and the same IP, had been cancelled due to maintenance. The evening before the make-up flight, the instructor pilot decided there was no need to show at 0630 and he called the other pilots telling them to meet him at the aircraft at 0800 — the briefing and mission would be the same as for the cancelled mission two days earlier.

They all met as agreed at 0800 the next morning. Only this time they had a D model instead of a B model and the weather was lousy. They quickly decided to fly to another field for their training.

As each pilot got into the seat for his portion of the mission the IP asked him what he needed to complete the mission. Then the IP briefly outlined what they would be doing.

About three hours into the mission, as the third pilot was shooting a practice approach, the IP retarded the throttle on number two engine and said the engine was simulated failed. About this same time the approach controller notified them that the weather at the field they were using was approaching minimums. The IP acknowledged and they continued the approach.

Upon reaching minimums the runway was not in sight and the IP called missed approach. The upgrade pilot increased the throttle on number one and concentrated on keeping the aircraft tracking straight ahead. (The IP still had number two throttle pulled to idle.) It soon became apparent to both pilots that they were not climbing fast enough, and the IP quickly raised the gear that had not been raised on the go-around checklist. The IP had been talking on the radio, trying to get clearance back to home station, and did not hear the pilot call for the checklist; the pilot was too busy maintaining control of the aircraft to reach over and raise the gear. Suddenly trees loomed ahead and the IP grabbed the controls, jammed both throttles wide open, and pulled. The Convair leap-frogged over the trees and began to climb. The IP maintained control of the aircraft and returned home without further incident.

* * *

It doesn't take a magician to compare these two missions and figure out the message. You might title them the "Professionals" and the "Unprofessionals." The first IP recognized the importance of the flight, took it seriously, briefed carefully, and then followed his plan to ensure that the pilot was ready to upgrade. Also, the pilot in the first scene knew his aircraft and its systems, and was ready to meet the challenge of a very thorough instructional ride.

In contrast, the second IP treated the flight very lightly — his plan seemed to be: let's get the squares filled and get as many people upgraded as possible. The IP compounded the situation, which should have been routine, by first simulating an engine emergency in weather, and then, even more, by not bringing number two back to full power during the actual missed approach.

Further, the IP was negligent by allowing himself to be distracted by the radio when he should have been raising the gear.

The pilot in the left seat was partly at fault for not being aware of the poor climb performance of the Convair on one engine and did not make a plea to the IP to get the gear up and the other engine back in use. It is also obvious that neither the pilot nor the IP were aware of the minimum safe altitude in their area.

You're probably saying that this Convair incident just couldn't happen again. Unfortunately, scarier things happen on training flights and will continue to happen — unless we all become more like the professional IP and upgrade pilot in the first instructional ride.

GOOD SHOW

MILITARY AIRLIFT COMMAND

Maj Fernand M. Espiau, a flight examiner from the 41 ARRWg, demonstrated outstanding pilot ability in saving his HH-43 from plunging into the ocean.

Late last fall at Andersen AFB, Guam, he and his crew had just completed an overwater hoist recovery training operation and had started takeoff. At approximately 100 feet and 40 to 50 knots, the engine lost power. Maj Espiau took immediate action to prepare the helicopter for possible ditching and switched the fuel control to emergency. As he initiated the emergency procedures, his problems were complicated when two of the three emergency flotation bags ruptured on deployment. The tiny chopper was now settling rapidly with the rotor rpm at absolute minimum. But Maj Espiau was able to manually control the fuel, regaining rotor rpm and stopping the descent 50 feet above the water.

Under normal controlled training conditions, transition from the normal to the emergency fuel control results in a considerable loss of altitude, but Maj Espiau's immediate recognition of the nature of the emergency and his direct, positive corrective action resulted in a successful emergency fuel control operation under extremely critical and deteriorating conditions.

With the rotor rpm regained, Maj Espiau flew the Huskie to the beachhead and landed.

Maj Espiau's commander has nominated him for an Air Force Well Done for this accomplishment. The MAC Flyer congratulates him and adds a Good Show.

A flight surgeon's report on human factors in helicopter flying.

Chopper Crew Contamination

Perhaps due to their utilitarian nature, rotary winged aircraft have not enjoyed the status and glamour associated with the high altitude and supersonic aircraft of our times. To many, the word "helicopter" connotes "aerial truck," and at first glance the human factors aspects of rotary wing flight might appear to be no more significant than those associated with a truck. For this and other reasons, the human factors considerations unique to rotary wing flying have not been investigated as thoroughly as some other forms of aviation. There is much work to be done in this field before flight surgeons and commanders can fully appreciate aircrew stresses inherent in operating the machine. With a better understanding of the machine, its limitations, and the human stresses involved, the helicopter can be utilized more effectively and rotary winged units will no longer be regarded as "strange little detachments down at the end of the line."

Attitude

The first hurdle in studying rotary wing flying has been to cease to regard a helicopter as an airborne truck or an airplane with a propeller on top. It is a unique type of flying vehicle possessing its own aerodynamic characteristics and operating limitations. Where fixed wing flying has developed from Kitty Hawk to its present diversity, helicopter flight is for the most part a post-WW II development. Rapid technological improvements have tended to ease the physical labor involved in flying modern generation helicopters but unique stresses still exist.

Aircraft Limitations

The helicopter by its very nature is unstable. The control inputs into the collective do not react instantaneously; there is a 90-degree phase lag built into the cyclic control. This means you act now and pay later, so to speak. Therefore, much anticipation and judgment are required to fly the machine. To the beginning student, this poses considerable difficulty when transitioning from fixed wing flying. It is surprising how rapidly proficiency can deteriorate, even for experienced aircrews. Interaction between the various controls also contributes to the difficulties.

by Maj O. W. Skjenna
Flight Surgeon
CFB Portage La Prairie

Turbine engines alleviate this complication somewhat because throttle control is not as critical since it is automatically controlled and governed.

Background

Helicopters have been called "ten thousand moving parts flying in loose formation" and many of them do give you that impression since they are noisy, rough, uncomfortable vibrating machines — some especially so. For the uninitiated, there are basically four controls in a helicopter — the cyclic which governs the rotor disc angle, the pedals which provide directional control and control yaw, the collective which governs the angle of attack of the rotor blades, and the throttle which governs the rotor rpm. A change in one normally requires adjustments in others. A small amount of inbalance or misrigging can and usually does lead to vibration problems. Even some of the newer helicopters are on the rough side and hearing protection must certainly be employed by the crew. The cockpits are often poorly ventilated and are many times hot or cold depending upon the weather. All of these factors, coupled to the physical energy required to actually

fly the machine (studies have shown that the energy expenditure is significantly higher than for fixed wing), added to the "nervous" stress of operating close to operating limits, make it clear that helicopter flying is a demanding task. Some of the various stresses are covered in more detail.

Noise

The engine(s) provide power for lift as well as a small amount of thrust, and in earlier models relatively large piston power plants were used. With conversion to jet engines, the power-to-weight requirement has necessitated very high engine rpm. Both types of engines develop considerable noise in most instances. In most helicopters the engine and cockpit have not been adequately isolated. The moving parts of the main rotor transmission and the aerodynamic "wop-wop" created by the blades add to the noise. During summer months when temperatures soar, the machines are often flown with the doors open, reducing the noise insulation. Aside from auditory damage, the most noticeable effects of noise at various frequencies and intensities are drowsiness and fatigue as well as irritability. Vertigo may also be induced in individuals who are susceptible.

Vibration

Vibration is really just a low frequency, high amplitude noise and is present in all helicopters, often within the discomfort zone. The most dangerous vibrations occur in a frequency range of six to eight CPS due to amplification provided by the natural resonance of the body. Vibrations in these frequency ranges may result in loss of binocular vision, visual impairment, and disorientation. More chronic pathology such as osteoarthritis of the spine, herniated discs, etc., may develop from prolonged exposure to vibration. Short exposure often results in back pain which is aggravated by the slouching posture helicopter pilots often adopt. Fixed positions of flight controls and non-adjustable seats add to this problem.

Disorientation

One of the features of helicopters which render them so valuable is their ability to maneuver in any axis: true three dimensional flight. Unfortunately, in only the most expensive helicopters, equipped with Doppler instruments, can one determine whether or not sidewards translation is occurring. Analysis of U.S. Army accidents in reduced visibility has shown that most resulted in a sidewards impact with the ground.

Because of proximity to the ground, helicopter pilots are sometimes guilty of taking off in below minimum conditions, thinking they can land if conditions worsen. Most helicopters are not capable of true IFR flight, especially at low airspeed. The most critical conditions in this regard are fog, white out due to blowing snow (loose snow is churned up during landing in even CAVU conditions during the winter), or black night.

Minor visual illusions are common in helicopter flying. For example, in rising to a hover, one is easily misled in interpreting a movement forward due to the displacement rearwards of objects close to the helicopter and the tendency is to take off with rearward drift, particularly at night when lights are used as references. The opposite occurs in landing from a hover. Similar illusions occur during pedal turns in the hover.

Flicker (Photic Stimulation)

Flicker, due to interruptions of the sun's rays by the revolving rotor, may result in an individual suffering anything from mild discomfort, nausea, and fatigue to loss of consciousness, vertigo, or convulsions. The most critical frequencies are in the ranges of 4 to 30 flickers per second.

9-15 FPS — Subjective effects

6-8 FPS — Loss of depth perception

2-5 FPS — Inability to concentrate

(For more information on flicker effects, see "Flicker Vertigo" in TMF May, 1972.)

Cockpit Contamination

Helicopters remain airborne by driving a large mass of air down over the aircraft. Consequently, cockpit contamination can present a difficulty, particularly in the hover, since in this configuration helicopters are literally wallowing in their own excreta. The limit of carbon monoxide pollution is 100 parts per million, but human tolerance level diminishes with altitude. Problems may arise particularly in winter conditions when heaters are used and the cockpit ventilation is poorest.

Conclusion

The helicopter is a relatively new addition to the aviation inventories of armed forces throughout the world. Large technological improvements have made flying a rotary wing aircraft less difficult, but stresses are still evident in contemporary models. Just as fighter, transport, search and rescue, and training aircraft have unique demands upon the techniques and judgment abilities of their crews, so do helicopters. There is a field of study, yet unexplored, for specialists of all kinds to investigate. It is obvious that helicopters are more complex than what appears at first glance. They really are not as easy to fly as they seem to be in the hands of a skilled, professional pilot, and it becomes apparent that there are deficiencies in design from the human factors standpoint. Other areas such as escape systems and basic engineering problems are being researched but much remains to be done before we have the ideal machine. In the meantime, cognizance of the deficiencies and understanding of the limitations should allow for operation of existing machines in the most effective and safe manner.

Writing Contest Rules

Who can enter? You can. All aircrew members, maintenance, and support people are vital to flying safety and are urged to enter. While only military personnel and DAF civilians assigned to MAC or MAC reserve forces are eligible for awards, anyone can submit an entry. All "non-award eligibles" will receive appropriate special recognition. No more than three entries per individual — please!

The first three place winners will receive an engraved walnut desk set. Honorable Mention winners will receive a handsome pen and pencil set.

Your entry must be original, unpublished, and have a valid flying safety message for MAC. Please keep each entry between 1,000 and 3,000 words. That's about 6-14 pages, double spaced.

Your entry should be typed in two copies, double spaced, with no identification except the title. Then attach a cover sheet with the story title, your name, address (military address if you have one) and a brief biographical sketch. Mail your entry to: The MAC Flying Safety Writing Contest, MAC/IGYE, Scott AFB, Illinois, 62225. Entries must be postmarked no later than 31 March 1973, and must be received at MAC/IGYE on or before 7 April 1973.

Here's a mini-drama about a forgetful husband who's mistaken for a Class II bachelor when he practices...

Appendage Conservation

by Lt Col William H. Berner, USAAAVS

Ah ha!" snapped Sergeant Torkwrench's wife as he stepped through the front door after a hard day's work and two — maybe three — beers at happy hour. "Caught you at last!"

He paled and rapidly inventoried his recent undisclosed sins, wondering which had been exposed and how.

"Where's your wedding ring, you wretch?" she shrieked before he had time to complete his inventory and search for an alibi.

"In my pocket," he replied, heaving a sigh of relief.

"What's it doing there?" she hissed. "You been playing bachelor again?"

"No! The maintenance officer told me to take it off. And the commander, safety officer, and flight surgeon agreed with him!"

Mrs. Torkwrench's anger faded. Her hands dropped to her sides. "What got those four together?"

"The wing safety meeting." Torkwrench's voice calmed. "The safety officer told all of us — crewmembers and maintenance troops — that wearing rings can be dangerous for people who work with their hands. Jewelry can snag protruding parts on the stuff we work with, whether it's aircraft or vehicle maintenance, carpentry, plumbing, machinery operation or any other job where you work with your hands. He also reminded us that metal jewelry and neck chains make excellent electrical conductors. Not only can you get a nasty shock if your jewelry touches some hot circuit, but you may crack your head or fall off a platform when you jump from the shock.

"The flight surgeon explained why it's so dangerous to catch a watch or ring on something, especially if you are getting down from a platform, ladder or any other high place. He said that when a ring hangs up on something, the skin of the finger is usually cut through all the way around. Your finger can be cut off by the ring itself. But the doc said, even if it isn't, the finger usually has to be amputated. When the skin is peeled past a knuckle the blood supply to the skin is damaged so that it can't be repaired. The skin will die, leaving the tendons exposed, and the finger has to go.

"If a wrist watch peels the skin off and doesn't cut any tendons, the doc said, maybe a skin graft can be used to cover the bare area, if you're lucky. I don't even like to think about what could happen if a neck chain gets caught on something.

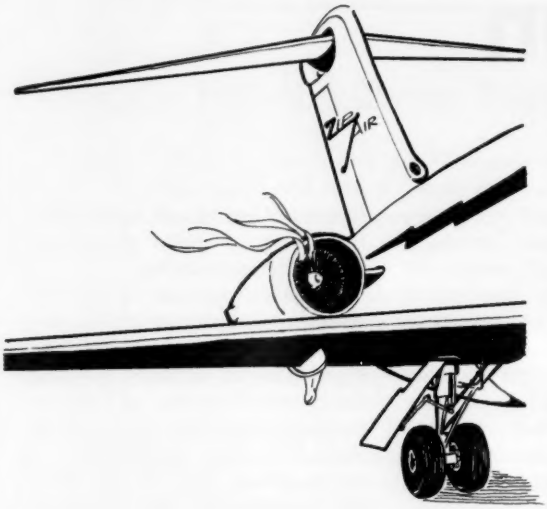
"After the doc was through, the old man got up and told us a good wing safety program takes more than just a monthly meeting. Each one of us has to take our responsibilities for doing things right. The flight surgeon and the safety officer can tell us about the hazards, but it's my job to remember to take off my ring and watch each day. As a supervisor, I have to make sure my people do, too. The commander left no doubt in anyone's mind that he was 100 percent behind the safety officer, the doc and supervisory personnel when it comes to practicing and, if need be, enforcing full-time accident prevention."

"Okay, okay," said Mrs. Torkwrench, "wash up and come to supper. But next time, put your ring back on **before** you go to Happy Hour."

NOTE: The reference to jewelry contained in AFM 127-101 is considered applicable only to flight crewmembers' wear of finger rings, not watches and dog tags, while performing flight duties. This also includes aircraft pre-flight duties.

Mini-Mishap:

Rush to a Long Delay



Recently, a fire developed in the right engine of a civilian twin-engine jet during engine start. Fortunately, the fire was well contained and no damage occurred.

Both the pilots in this incident were very frank and the cause of the fire was quickly and easily determined. It is related here so that all may learn from their mistakes.

The crew, consisting of an instructor and a captain under training, had planned for a mission of three legs, and were on the second leg when they were advised of a change for the third leg which necessitated the preparation of a new flight plan while on the ground.

A delay resulted, and an element of haste developed. The situation was aggravated further when the captain under training returned from flight planning to find the passengers already aboard. The start of the right engine was initiated without the ignition being switched to "Ground Start and Continuous" (an essential element in a start). In accordance with normal procedure, the fuel control lever was moved to the on position at 20 percent N_2. After the start had hung at approximately 25 percent for a short time, the error in respect to the ignition was realized and the start discontinued. However, contrary to unsatisfactory start procedure, the right engine fuel control lever was left on.

At this stage it was decided to start the left engine while the right engine ran down and the starter cooled. The ignition was switched to "Ground Start and Continuous." It was not too long after commencement of the start of the left engine that a fire in the right was observed and the information passed to the flight deck.

The pilot then discontinued the start on the left engine and redirected his attention to the right. Although the right starter was reengaged and held on for approximately 60 seconds, the fire was not fully extinguished and a fire bottle was discharged. A small amount of flame had extended into the lower cowl area. At no stage was there a cockpit indication of fire and the crew was kept informed by the dispatching engineer.

The incident can be summarized as follows:

1. The right engine failed to start because the cabin emergency lights switch had carelessly been placed "on" during the before-start check instead of the ignition being switched to "Ground Start and Continuous."
2. The right engine caught fire because the crew did not adhere to the unsatisfactory start procedure when the engine failed to light.
3. After being advised of the fire in the right engine, the crew action of engaging the starter for approximately 60 seconds almost certainly prevented extensive engine damage.

True, the crew was subjected to more than normal pressure and their actions were motivated by a desire to minimize delay. However, this does not excuse carelessness in cockpit checks and nonadherence to operating procedures.

(Flight Safety Facts & Analysis)

Jim Sampson offers some examples of C-5 boo-boos which can lead to aircraft damage and personal unemployment.

A Maintainer's Guide to Galaxy Bending

If you're interested in the C-5, you will be interested in this article taken from a talk presented by Mr. Jim Sampson at a 21 AF Safety Seminar. Mr. Sampson, then director of Aerospace Safety for Lockheed-Georgia, has taken a hypothetical mission setup and injected several actual incidents which occurred in and around the C-5 during ground operations — all of which were clearly preventable. If you've worked on the C-5, you will gain a deeper appreciation for what just a little mistake can lead to. If you haven't worked on the C-5, you will be exposed to the many problems of command and control — or supervision — involved in dealing with this giant aircraft on the ground. The situations you are about to read have been corrected by TCTOs, tech data, checklists, and procedural changes. However, these corrections don't preclude Murphy from getting into the act again.

* * *

Let's suppose you have several write-ups on a C-5 and it's very important to all concerned that the departure of this airplane be on time. You have six things to correct: a landing gear retraction problem, a hydraulic leak in the horizontal stabilizer area, an engine change, a fuel leak in one of the fuel tanks, fluctuating brake pressure, and an electrical problem. So we move out on the ramp to correct these six discrepancies.

Tech Data

To have a safe operation on the ramp, we must be sure that we have all of the tech data necessary to do whatever it is that needs to be done. We at Lockheed generally take that data right out to the airplane. We do this for several reasons. When we get the data out there, it's handy. A guy who fixed a brake problem two months ago and thinks he remembers how to fix that brake problem now is kidding himself. Chances are it's not the same brake or problem that he fixed before. Also, there may be changes in the tech data.

One Man

The first thing we do and I mean the *first* thing we do is have a man in charge. Somebody's got to be responsible. He's got to be responsible for everything. He must realize that no work can begin until he has a checklist and the checklist is run exactly as it is supposed to be done.

We get everything all set, and following the checklist we get the airplane on the jacks. The man in charge does not allow any additional work to be conducted on the airplane without his knowledge and approval. *Many of our mishaps have been as a result of work that has been accomplished in unrelated areas.* Putting electrical power on the airplane when you didn't want power, putting hydraulic pressure on the airplane when you didn't want hydraulic pressure, and so forth.

Now, the supervisor okays some work to be done on the number two engine. It's very important to get that engine changed. We've got to keep moving to get this airplane ready to go. The landing gear write-up is corrected, and the airplane is ready to be dejacked. The

number two engine is cowled back up and the engine maintenance stands are moved away. It's extra work, but you have to do it.

Calavar

About the time you're ready to dejack the airplane, the guy up on the horizontal stabilizer says, "Hey Charlie, wait just a minute. I'm just about through up here. Let me check this hydraulic leak and see if it's okay and then we can get this out of the way." Charlie says, "Fine." Now remember that the mechanic was lifted to the horizontal stabilizer by a Calavar. A very fine piece of equipment. It demands a lot of respect. You're working at tremendous heights. You are aware of course of the two gentlemen who were killed using a Calavar. In case you're not, I'll relate the situation. They were to do some training — they did it without permission. In this particular case, the Calavar had some restrictions on it which were exceeded during their training program. They did not follow a checklist by any stretch of the imagination, and the Calavar had open maintenance write-ups on it. They were at high altitude, limits were exceeded, and the actuator collapsed. It normally would not have happened — that's all there is to it. When it collapsed, the captain that was in the basket was thrown out of the basket landing face down on the concrete and was killed instantly. The sergeant that was in the basket hung on and impacted the back of the vehicle, and died on the way to the hospital. It's big equipment — you've got to respect it.

Also while you're working on the horizontal stabilizer, you must wear your maintenance restraint harness. It's not the most comfortable thing in the world, but it must be worn when you're on the horizontal stabilizer. If you have a helper, he can attach to the same attach point that you do. That's okay — there could be three of you up there and even though you're not supposed to be able to do this, we found — after the fact — that you can get three lanyards hooked onto one stud. Three people attached to one attach fitting is prohibited because all three of you might fall together and we suspect that you may pull the attach point out of the horizontal stabilizer. But let's get back to our maintenance problems.

RAT

We're now ready to give the mechanic on the horizontal stabilizer hydraulic pressure and electrical power to check out his work. But the ram air turbine (RAT), which provides additional hydraulic pressure to the flight control systems in the unlikely event that all four engines cease to function, is in the auto-mode. In this mode, if electrical power is applied, the RAT will automatically deploy. Normally, on the ground the RAT is in the retract mode. In this case, however, somehow, it's in the automatic mode, sitting on the ground. Electrical power is applied to the airplane; and the ram air turbine does just exactly what it's supposed to — it deploys. An injury or even worse — a fatality occurs. A very small mistake that can cause a very serious accident.

Panic Button

Now we move the airplane to fuel cell repair and properly ground it and rope off the area. At Lock-

heed-Georgia we have a rotating beacon which we put into action and a box where all ignitables or metallic materials must be placed before you go into the fuel cell repair area. The safety engineer checks to be sure that it is all set and safe for the fuel cell repair. Another safety engineer is required to check the LEL (lower explosive limit) in the fuel cell to be sure it's safe for a maintenance man to work in the tank. Periodically, the cell is rechecked. We also have an emergency horn that is nearby. We have several of these on our flight line. Many times you have no communications. You're out at the airplane with no power, no telephone, no fire truck; you simply don't have communications. If you have a problem, you say to yourself, "What do I do?" It's kind of comforting to know you've got a piece of equipment close at hand with a panic button on it. Just push the button and it lets out one hell of a noise. No one knows exactly what the problem is but they know someone nearby needs help.

Towing

Now we're getting ready to tow the airplane out of the fuel cell repair area, and again one man is in charge. He should satisfy himself that the checklist is in fact completed and the airplane is ready to move. He should check the indices on the nose landing gear and the landing gear scissor extension. If a turn of more than 45 degrees left or right is to be made, he must disconnect the nose gear scissors. He also should know that if the nose strut is overextended, it might engage the centering cams. If the centering cams are engaged when he is making a turn, the scissors will probably break.

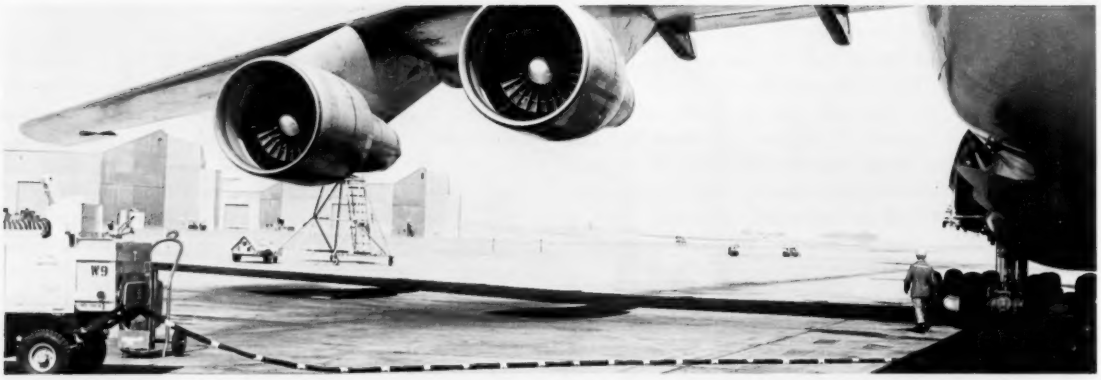
Also check the shear pin in the tow bar to be sure it's the proper pin. You will need to check inside the airplane too. The pilot's seat, if it's pushed all the way forward and all the way left, binds against the steering wheel and will restrict the system sufficiently to break the scissors on a fully extended nose landing gear during towing operation. If a man sitting in the pilot's seat decides to relax, and puts his foot on the NLG steering wheel and a turn is made with the tow bar, something is going to break. You also need to check the circuit breaker panels to be sure that the circuit breakers are pulled to disconnect rudder steering.

You want the APU running and you need hydraulic pressure. In our hypothetical case, let's say there's no electrical power in the area. The man at the engineer's panel will have to make a battery start. He reaches up to check his fire detection system and it dawns on him that since he will make a battery start, he has no fire detection system during start. He checks his battery voltage and finds normal battery voltage low. He checks the standby battery and sees that he has plenty of voltage and must make his start on the standby battery. But before he does this, he must go back in the airplane and disconnect the normal battery because there's a chance of a thermal run away and possible fire due to rapid recharge. There have been three accidents on other airplanes as a result of rapid charging of Ni-Cad batteries.

APU Starting

The man at the engineer's panel completes his checklist and is now ready to start. The marshaller goes out front — he's a long way out there and if he can't see you, you can't see him. We use walkie-talkies for communications at Lockheed. You must have someone with a walkie-talkie to give you advice on wingtip clearance. I know the people at MAC have been working for a couple of years on this problem, and now Air Force has authorized nontactical radios for use on each aircraft. The radios will have high noise type headsets and microphones. You really need them on this bird because of the noise from the APUs, other aircraft engines, or a hydraulic mule. Good communication is a must if something goes wrong and you must respond in a hurry.

About this time, the wing walker notifies the panel man that smoke is coming out of the APU compartment. The man at the panel shuts down the APU and pulls the T-handle — nothing happens. The APU keeps running — the firemen respond — punch in the APU door and put out the fire. The investigation reveals that the panel man, when going back through the checklists, through habit put his battery select switch back in the normal position on a disconnected battery and he didn't have power available to shut the APU down



or to operate the fire extinguishing system — another very small mistake. (Note: TCTOs have been performed to prevent this from happening again.) Believe it or not, these events really have happened.

Engine Change

Now you move down the runway to the engine replacement area, being very aware of what's going on at all times, always expecting the unexpected. You get the airplane in position to change the engine. When work is completed, the QC or safety man checks the engine. He goes through the tech orders to be sure the engine is properly installed and properly bought off. You see to it that the man at the engineer's panel and the man in the pilot's seat who is going to be starting the engine go through the checklists together, being sure the outside of the airplane is properly prepared for engine run and that everyone has proper ear protection. As the engine is started and power advanced, there is a big bang and cowling flies every place — the engine is shut down. Before I tell you what happened, let me give you some background information. The TF-39 engine operates at very high temperatures. In the original design the inlet guide vane anti-icing manifold, for example, was an exposed piece of metal tubing where temperatures could reach 900 degrees or pretty close to it — we had that corrected. We insisted upon a vapor barrier to give us some separation between the extremely hot section and the not so hot section of the engine. Remember, this engine runs at temperatures like you have never heard of before. In fact, some sections run up to 1,300 or 1,400 degrees surface temperature. Any combustible fluid that touches it is going to ignite. Anyway, we improved the fire detection system, and had the fuel manifold improved.

The vapor barrier maintains an environment for the engine driven accessories which essentially does not exceed 295 degrees. It also gives us better fire-fighting capability. In order to install the vapor barrier, it was necessary to put a skirt on it so all the hot sections would be covered, and so that we would have places to attach the barrier. When we did this, we covered the lifting lugs which are used for removing or replacing the engine. We put removable covers over the lugs. The covers can be taken off to expose the lifting lugs. In this particular case, when the engine was run these covers were not replaced, and it just so happened that a fuel line separated. When that fuel line separated, all the fumes and vapors came out through a series of vent holes on the back side of the vapor barrier into the very hot section I was telling you about and the explosion occurred. Again, a very small mistake — but terribly expensive. This could happen any place, on takeoff at maximum gross weight or half way across the ocean. If the covers are not replaced, the avenue is open to the very hot surface.

Remember now, we're under pressure to get this bird ready. So, we get another engine and install it on the airplane and we're about ready to go again. We start up the engine. It checks out okay — while we're doing that, we remember that we've got two more problems that we need to take care of. One of them, as you recall, was the fluctuating brake pressure. The other was a generator problem. The generator control panels are replaced, and the mechanic works on the hydraulic systems and reports the brake pressure looks okay.

Check the Brakes

All four engines are started and set at idle — everything looks pretty good. Move the power up a little bit— everything checks good again — advance power to about 1.5 EPRs. The man at the engineer's panel announces that he is losing hydraulic quantity on number 4 system and will depressurize the system. Remember now, alternate brakes are off number 1 system. Normal brakes are off the number 4 system.

The man in the copilot's seat should call the fire

department. He also should select emergency brakes, but in this case he doesn't and the switch is placed to alternate brakes. As the power is advanced some more, the electrician checks the electrical problem — everything looks good, the man in the right seat checks the fluctuating brake pressure. He moves the brake selector switch to normal, to emergency, back to normal, and to alternate. Power is advanced and he again manipulates the brake selector switch. Everything is okay so far.

He advances the power some more and the airplane jumps the chocks and runs across the ramp. There's another C-5 straight ahead of him. The man in the left seat throws all engines in max reverse, the airplane seems to go faster. They're applying the brakes for all they're worth. It's two o'clock in the morning when all of these type things happen, of course, and there is that big C-5 in front of him — we are about to have the biggest airplane disaster that the military has ever had.

Then the airplane comes to a screaming halt. The wheels are chocked and the ground crew abandons the airplane. Do you know what happened? A check reveals a very simple mistake. The crewman on his last manipulation left the brake switch in the normal position, which was the normal place to leave it *except* in this case with the normal system depressurized. He had no brakes, and when they started across the ramp, he was pumping his brakes but nothing was happening. Finally, he threw the switch into the emergency position, the emergency brake functioned as advertised and the airplane stopped. Little mistakes are serious mistakes. What is the probability that it can happen again? Unfortunately, the chances of this general type mistake are very high and it's a hell of a way to maintain an airplane, don't you all agree?

There are more of these types of activities going on than any of us like to admit.

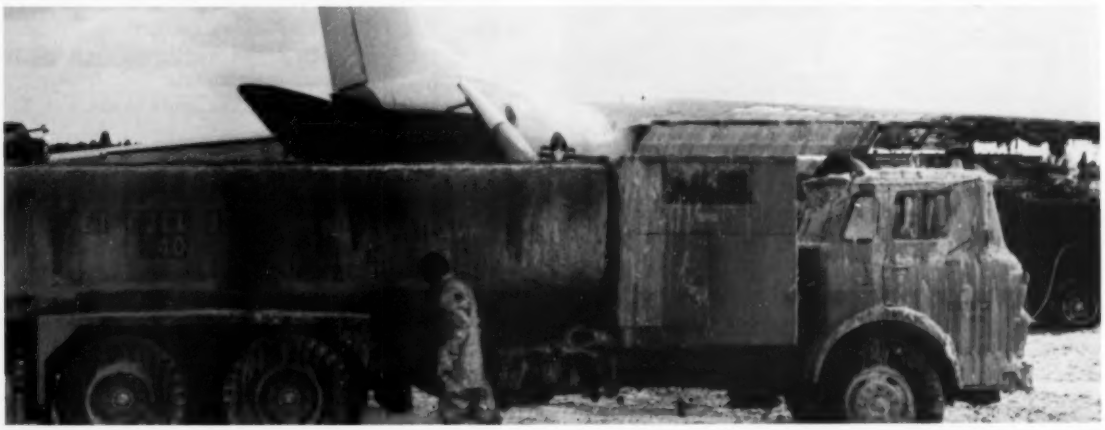
Well, we can end this hypothetical story by saying — we got the bird ready. But I must add, that if all of these things would have happened on the same base at the same time — the wing commander and many more would probably become unemployed.

Other Mistakes

There are lots of other ways that you can make mistakes. For example, if you're unloading an airplane and have a maintenance stand under a wingtip, you're going to hit something. If you're going to the opposite side of the plane to kneel a gear and change a tire, you're likely to hit something. I guess there have been fifteen wingtips dinged because somebody left a stand over or under a wingtip when changing a wheel, or a brake, or a tire. They never think about the maintenance stand that is hanging over the wing. You've got to watch these things. You've got to look above the airplane as well as below the airplane when kneeling the C-5.

Checking the precharge on the APU accumulator can create interesting problems too. Your tech data tells you exactly how to do it. I'll tell you about something that has happened. You can hold the depress valve down to check the precharge and it is possible to discharge the accumulator at such a rate that it will accelerate the APU up to about 10 percent. When it reaches about 10 percent, the permanent magnet generator will give you ignition and the APU will start. This just scares the hell out of you. It will stop very quickly, however, unless someone has placed the APU run switch in the run position, and in that case it will come up on speed.

Here's another common one. Someone comes out to work on the flaps or someone comes out to do something else on the airplane cargo doors — it doesn't matter. Someone has the flap handle in the down position, so what happens? The flaps extend when hydraulic pressure is applied. The leading edge slats also extend. If the pylon mounted engine hoist is installed, it can really



tear up things as the leading edge slats extend.

If you refuel a C-5 by using a truck, it's no different from refueling a C-141. I'm sure that all of you are familiar with the fire during refueling on a C-141 at Pope AFB. When using two trucks and one truck stops pumping, the other truck will pump fuel into the airplane and right back out the other side into the other truck. That's the way a C-5 will do it too. That's the way the C-141 will do it — that's the way any plane will do it with dual single point refueling capability. You've got to watch the flow meters on the trucks. You've got to be sure that you have a flow and that the flow is in the right direction anytime you use multiple trucks in fueling an airplane.

This next example really hurts. We spent a ton of money trying to Murphy-proof this aircraft. We were sick and tired of crossed connections and so forth. I talked to the safety guys and we decided that we were going to Murphy-proof everything. It's not really that simple, though, because the SPO has a say so, the designer has a vote, the purchasing people have a very large vote, the weight is a strong consideration, tradeoffs must be made, and the best compromise arrived at. At any rate, one day an airplane was taking off and on that particular day it was necessary to abort. They aborted and tires blew like crazy. Now, you know we just don't blow tires on this airplane, since we corrected an anti-rotation problem some years ago. So, they brought the airplane back to the ramp and what do you know? The brake lines were crossed, a situation we thought just couldn't happen, and do you know where this happened? Right here at the Lockheed-Georgia Company where all the experts are.

There are many other interesting ways you can mess up the airplane. You're working on the side doors at the aft end of the airplane and the maintenance man performing this work requests power so that the doors can be actuated. The airplane is being loaded from the front end and it is in forward kneel. Forward kneeling is accomplished by retracting the nose gear. The maintenance man in the copilot's seat attempts to supply the power by throwing the switch on the ADS panel. Still no power is received at the rear doors. Remembering his system, he knows ADS won't work unless airborne. So, he pulls the circuit breakers on the squat switches. The nose of the aircraft starts up and the aft end of the aircraft starts down. This occurred because the landing gear handle was in the down position and the circuit breakers for the touchdown relays were pulled. The aircraft thought it was airborne and the resulting signal to the nose gear indicated that it should go down. So that's just what it did.

Or you can do it another way. You can be loading the airplane and it's a hot day — there's a forklift coming up the ramp and you decide to open the aft pressure door to try and get some ventilation through this machine. You open the aft pressure door by going through the same steps I just mentioned. You get the same results, but about the time the forklift driver is coming up the ramp, the airplane starts to unkneel. This presents a few exciting moments.

Wrap Up

I could relate more but I think you get the idea. I've tried to cover actual incidents that both we at Lockheed and you in MAC have experienced. Everything I've mentioned here has happened. As I said earlier, these problems have been corrected, but with such a large airplane, everyone has to do his job right — the first time. You've always got to expect the unexpected with this airplane — you've got to respect it. It's not perfect — but most things very rarely are.

Global Notes

15,000 accident-free

General Carlton has forwarded letters of commendation to Major General Gonge, Commander 22 AF, and Brigadier General Sterling, Commander 443d MAWg, congratulating MSgt Peter J. Thomasian, 4 MASq, MSgt Joseph B. Wolfert, 8 MASq, McChord AFB, and MSgt James H. Vickers, 57 MASq, Altus AFB, for amassing 15,000 accident-free flying hours. General Carlton commended them for this remarkable achievement which places them in a very select group. Each man will be presented a 15,000 hour lapel pin and patches for his contribution to the safety accomplishment of MAC's global missions.

Photo by Sgt Michael Storey

Photo by A1C Tim Wilson

award winners

Seven men earned Outstanding Individual Safety Awards during November and December.

Maj Larry A. Granquist, 53 WRSq, was cited for his quick actions which led to a safe landing during a WC-130 training flight when number four propeller oversped and could not be feathered.

Capt Robert M. Anderson, 1550 FTSq, was recognized for successfully handling a TH-1F in-flight engine malfunction and exhaust pipe fire.

Capt James J. Full, 2d Lt Robert C. Lewis, and **TSgt Kenneth D. Brucklacher,** 55 WRSq WC-130 crew, received the OISA for recovering their aircraft after number one engine went into reverse and caused severe directional control problems during a touch and go landing.

MSgt Cesare Bruno, 63 MAWg life support specialist, was cited for recognizing and providing solutions for the C-141 life raft canister release mechanism problem.

1st Lt Gordon C. Rains, Det 1, 44 ARRSq, was lauded for his thorough evaluation and quick actions which led to a safe landing of his UH-1N after a transmission oil line ruptured.

outstanding airmanship

Maj Frank J. Renaldi and his WC-130 aerial reconnaissance crew were nominated by MAC for the Mackay Trophy. This is an Air Force award given to the "most meritorious flight of the year" by an Air Force person, persons, or organizations. On 8 July 1972 Maj Renaldi and his crew skillfully flew their WC-130 through the extremely treacherous weather conditions of Typhoon Rita to visually locate and assist in the rescue of six downed B-52 crewmembers. Their unselfish and devoted actions were instrumental in the successful recovery of five of the six distressed airmen. They were officially lauded by Secretary of Defense Laird for participating in one of the most daring rescues in history, and Admiral T. H. Moorer, the Chairman of the Joint Chiefs of Staff, congratulated the crew for the outstanding airmanship and courage.

C. R. tries a bit of aerial show-and-tell and demonstrates more than he planned.

C.R. TERROR

"Hey, Sammy, where the heck are you?" exclaimed the Chief Charmer of Cyclic and Collective as he clutched a martini in one hand and the phone in the other.

"Just up the road a piece at Disneyland East, boss," replied his stalwart ex-cojock. "I had heard that you had rotated back — how the devil did you avoid the rated supplement and get a plush assignment to Patrick?"

"I got to the wing commander's secretary," snickered the Bald Baron, "but that's a long story which we'll discuss further over a pitcher of olives. How soon can you meet me at the club?"

Sam hesitated a second and then said, "Gee chief, I've got the family with me and we've got today's activities planned. But I sure would like to see the inside of one of your choppers and maybe bend my elbow a little with you. I'll leave the missus and the kids with grandma in the morning and come down and spend the day with you. How about 0900 tomorrow?"

"Great," enthused C. R. "I think I can get a bird, too — I'll take you for a quick orientation ride."

"Oh, no you don't," answered Sammy, "you're not gettin' **me** in one of those flying accidents. Just a look inside will do."

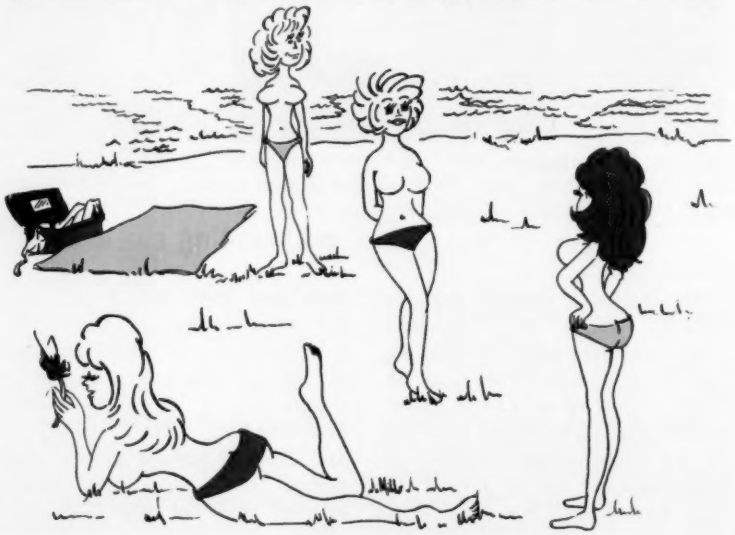
Sam met the Rotund One as planned, and C. R. gave him a guided tour of the HH-53. C. R. knew that he would be able to talk Sam into taking a ride, so, though Sam didn't know it, he had planned ahead, gathered a crew and filed a VFR flight plan out to the practice area and back.

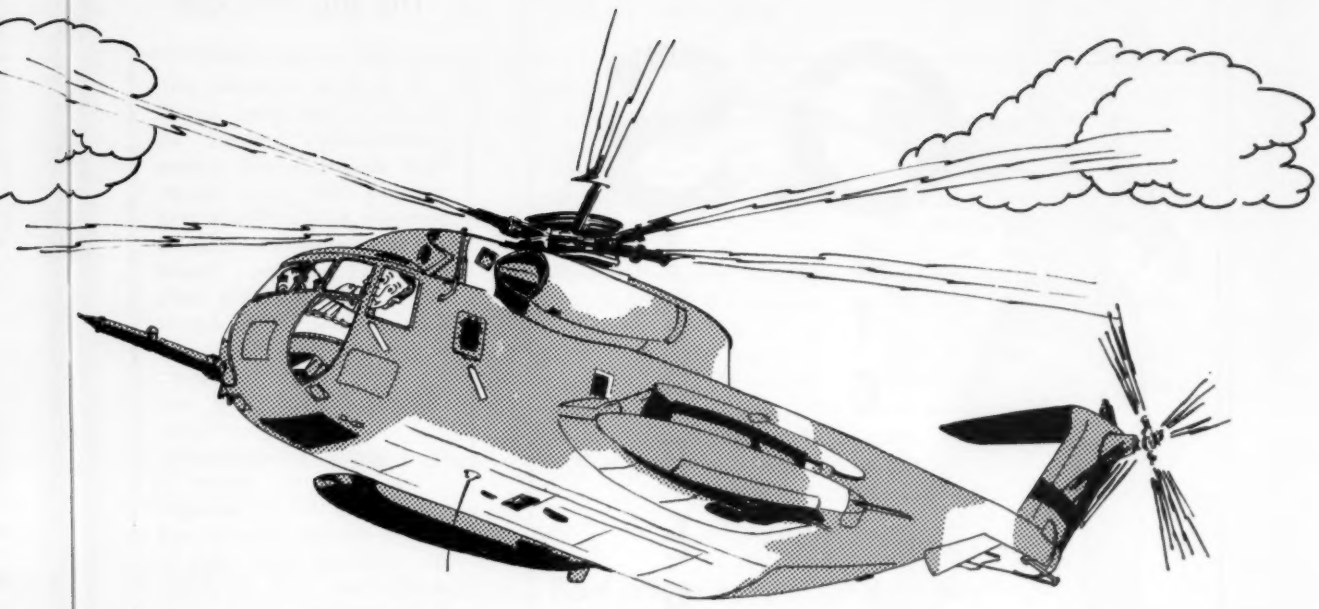
"Come on, Sam," ordered C. R. "Get in the left seat and I'll show you how sophisticated this buggy is."

C. R. continued his briefing right down to showing Sam how to start the engines, while the co-pilot and flight mech looked on.

"Hey, what're you doing!" shouted Sam. "Let me out of here! Do you have clearance to do this?"

"Sure, dummy; relax. I filed a clearance and everything. You don't think I'd do anything illegal, do you?" Sam quickly fastened and tightened his seat belt and shoulder harness as C. R. called





tower for takeoff. The next thing Sam knew they were low-leveling it down the beach with C. R. waving to several bikini-clad dolls and doing a particularly steep and tight 360 over a group of four. Sam's eyes bugged a little when he realized that the gals were only half bikinied.

"Com'on, boss, let's get out of here before they get our tail number and report us," Sam said, still straining his neck for one last look.

As the Rotund Rotor Wrestler leveled the big bird and headed inland, he quickly briefed Sam on a couple of tactical maneuvers that he was going to show him—all the time bragging on how versatile and exciting an airplane this was to fly.

"It's just like flying CAM all the time," said C. R. "But we do lots of other interesting things too, like air-to-air refueling and picking up Apollo and Skylab escape capsules." The Great One cleared himself left and right and then continued, "Now here's a tactical letdown approach and pickup." He banked the big chopper and dove for a densely tree-covered area with a small clearing in the center.

"About here," he said, "is where we slow up and get right down on the treetops so the bad guys can't see us. Then when we see the rescuee's red smoke we pull up like this"—the Gs pushed Sam deep into his seat — "to a hover and lower the hoist." Sam's knuckles were white from the strangle-hold he had on the seat. He was sure the helicopter would soon fall out of the sky, and he flinched as he saw the airspeed drop below 60 knots.

As the Buff came to a hover, the trees below looked like they were in a hurricane. **And then it happened.** The bird shook violently as a loud crash and thump echoed in the cockpit. It seemed like an eternity before the stubborn chopper slowly rose and moved forward. As they gained altitude and airspeed, a noticeable vibration developed. C. R., turning a bit pale, headed directly back to base.

By the time they landed, Sam still wasn't sure whether he was shaking from fear or from the vibration. But when the flight mech found four of the six main blade tips damaged — he knew.

The Fearless Leader turned to address Sam, who by this time had regained his land legs, but he was cut short.

"Boss, are you ever going to learn?" scolded Sam. "You could have killed us. Not only that — you might have destroyed a valuable aircraft. All just to be showing off. What are you going to tell your boss?"

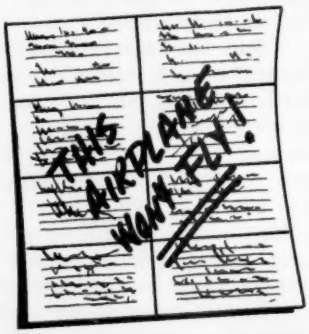
C. R. stood silent for a second and then responded, "Well, I'll tell him he's missed his turn — I've **already** been chewed out by a practicing **junior** C.O."

The Big Whoosh

In a recent two-month period, we've had seven loss-of-pressurization incidents on MAC aircraft. Several of these incidents were rapid decompressions, highlighting the need for all crewmembers to review oxygen procedures. Several things that you should check are the location of the nearest walk-around bottle; location of your mask and that it is clean and operable; that it's connected; that the aircraft oxygen system is operating properly and sufficient oxygen is aboard; and that the passenger system operates properly and the passengers know what to do and how to use the system if they need to.

MAC is taking actions to alleviate the rash of pressurization problems, but in the meantime review your oxygen procedures.

A Tip for Sharp Operators



How often have you arrived at your bird to find 60 to 70 open write-ups? How long does it take you to read them? Do you read all of them? We know a lot of open write-ups are being carried forward, and we're trying to get the situation corrected — but until it is corrected make sure you know what these discrepancies are. A recent in-flight flight control problem, leading to a diversion into a foreign civil field, emphasizes the need to read *all* the write-ups.

If you were a doctor, would you operate without completely reviewing the patient's medical record?

MAC Murphy

It's rather disconcerting to be serenely flying along and suddenly have one of your aircraft's two engines automatically feather. This recently happened to a T-29 crew. They fortunately were able to cope with the situation and landed without incident. Investigators found that the auto feather throttle microswitch was improperly adjusted. But the story does not end here. On the engine which feathered, the feather microswitch was found to be set near the correct value for that of the landing gear warning circuit microswitch. Though no previous work on the auto feather microswitches could be documented, review of the maintenance records showed that the gear warning circuits had recently been adjusted. We think you can figure out for yourself what happened.

For all T-29 maintenance men — the microswitches and actuating cams for both the auto feather and gear circuits are located in the same area and appear identical to each other. Watch it.

Toluene -- Bad News for Flight Crews

The pilot accepted the F-4 from programmed depot maintenance (PDM), cranked up, and taxied out. As he moved down the taxiway, he noticed a faint foreign odor in the oxygen system. During PDM, the aircraft had been repainted, and because of this the pilot dismissed the odors as fresh paint and continued the mission. As he leveled off at FL 330, he realized that he had hypoxia symptoms and declared an emergency. During his descent he suffered quite a bit of physiological impairment but landed safely.

Investigators promptly began a careful check and identified freon, acetone, and toluene in the oxygen system, but not in the oxygen itself. They finally determined that these agents were present in the oxygen hose leading to the oxygen mask. Apparently, during grease removal prior to painting, these agents were spilled on the hose. Freon and acetone are mildly toxic, but toluene, even in small quantities, can cause physiological impairment. The investigators poured a small amount of toluene on an oxygen hose and after five days still could smell faint odors.

When the MAC safety monitors received this report, they did a lot of checking to see if our maintenance troops use toluene (a degreasing solvent). This is what they found:

a. Per TO 1-1-1, 1-1-2, and 1-1-8, we use only P-D-680 Safety Solvent.

b. When painting inside a cockpit or aircraft, all oxygen masks and hoses are stored in the life support section during painting operations. (This will become even more important when the Sierra quick-don masks are installed in all MAC aircraft.)

c. The only place we could find toluene used for cleaning was under the provisions of TO 1-1-24, which covers stripping neoprene off radomes, and this is accomplished away from the aircraft and in a controlled environment.

d. Toluene is also used to some extent in sheet metal shops and in some paint shops as a thinner for lead chromate primer.

e. Since this solvent is used by AFLC in PDM, all crews picking up aircraft should be very cautious and leery of any strange or unidentified odor.

f. All maintenance people should know about the effects of toluene before they use it.

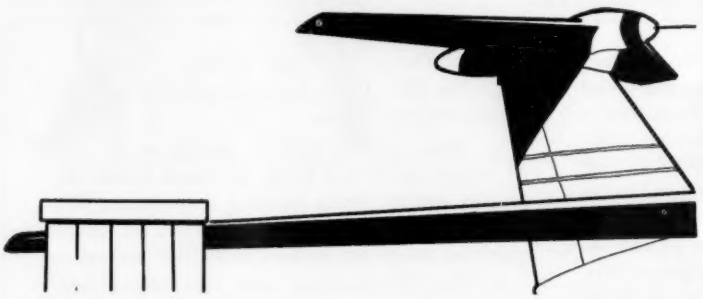
Fortunately, this was only an incident, there was no serious injury or damage to an aircraft, and the ensuing investigation proved enlightening. We may not be so lucky next time.

Sealed Boxes = Bad News

As the aircraft leveled off at cruise altitude, strong fumes began filling the cockpit. When the loadmaster found unidentified cargo leaking on the number six pallet, the aircraft commander announced "toxic fumes, toxic fumes — everyone on 100 percent oxygen!" Then he called for return clearance and turned his sleek Starlifter back toward home.

The crew and aircraft recovered at home station without mishap. Investigators found out that the cargo, which had been received through non-Air Force postal or express channels, was not opened and inspected because USAF is not authorized to open U.S. mail. To correct the problem, MAC has asked Air Force cargo division managers for authority to thoroughly inspect all cargo received through these non-Air Force channels.

The Driver Buys the Bash



Attention, pilots! Airfield managers, aerial port workers, and ground marshalers are *still* out to get you. That's right; these people are *still* cluttering air bases, crowding taxiways, and designing obstacle courses for you to traverse. When the marshaler leads you down a primrose path and you bash a wingtip, or you blow over haphazardly stacked cargo, or you blow sand in some honcho's face, they'll all point the finger at you. Because you're the aircraft commander, you can't let yourself be lead down this tricky trail (even though the tower tells you to follow the follow-me truck).

In two recent occurrences, one at a non-MAC base and another at a civilian terminal, the pilots were held responsible for ground damage to aircraft and to cargo stacked around the terminal. The ground troops may have been embarrassed, but they got off scot-free.

We can only recommend that you be very, very careful — especially with the use of power — and if you don't like the looks of things, deplane a scanner and check things out. If it's too close shut down or hold your position until the situation is corrected.

Nomex on the Outside

The weather was beastly cold. The crewmember attempted to stay warm by slipping on his quilted insulated underwear jacket over his Nomex flight suit. This kept him warm, but in an ensuing crash and post-flight fire the nylon insulated jacket melted and the crewmember received severe burns. The Nomex flight suit was not seriously damaged though.

When you think of Nomex as a flame barrier, it makes sense to get this barrier as far away from the skin as possible. If you need extra clothes such as the insulated underwear, we suggest you wear them under the Nomex suit.

What about the nylon flight jacket? Won't it melt, too? Yes, and we realize that it's impractical to wear your flight jacket under your flight suit, but frankly we don't have an answer for you right now. We can suggest that in moderate weather you wear heavy underwear under the Nomex in place of the jacket. Until we have fire-retardant jackets, it's best to use the Nomex suit as the outer garment whenever possible.

Beware

Beware of the temperature and altimeter settings you hear over ATIS broadcasts. FAA has no set standard on how much the temp or altimeter have to change before the ATIS tape must be updated. It's up to the tower folks to include the latest information. Most do, but some don't.

That Tricky First Bounce

It was near the end of a long overwater mission, and the copilot was making the approach and landing from the left seat. The aircraft commander, in the right seat, monitored the GCA, the roundout, and the clean but firm touchdown. Everything appeared normal until the spoilers were deployed. At this point the nose suddenly came up and the aircraft again was airborne. The copilot's apparent reaction was to pull hard against the new sink rate — and the next touchdown was in a very nose-high attitude. This time the gear stuck to the runway, and a normal roll-out followed. At least the crew thought it was normal — they were surprised when the tower notified them that the tail of the aircraft had dragged on the runway during the second landing.

The crew taxied the bird to the ramp and parked it. Post flight inspection revealed sheet metal damage to the entire length of the ramp door and to the leading edge of both petal doors.

It appears the aircraft commander bought this one as supervisory error. He allowed the copilot's improper bounce recovery technique to go uncorrected. Both pilots earned a free trip home and some extra training, which we hope included reading "The Final Fifty Feet" from our February 1972 issue.

after deadline . . . .

BRAKE SNIFFERS BEWARE -- The brake pads on the C-5 contain beryllium, an extremely toxic metal. If you work around C-5 brakes, keep in mind that a good sniff of either the smoke or the fumes could do you in. Precautions:

* When inspecting a hot brake, approach it from the upwind side.
* Stay out of any smoke or visible fumes.
* Keep clear of the downwind danger zone -- 100 feet is good.
* If you are exposed to the smoke or fumes, immediately notify your military public health folks.

CROSS CHECK ITEM -- Can a C-5 CADC malfunction without triggering the warning flags on the corresponding vertical tapes? Yes, according to a recent report. During a training mission, the pilot was maintaining 145 knots and 1,500 feet above the ground to the final fix. He selected landing flaps, reduced power, and started descent -- with no apparent airspeed change and with an altitude increase of approximately 100 fpm. So, he pulled off more power -- and then the IP warned that he was below approach speed.

At this time the discrepancies in indications were noted and the IP took over, completing the approach from the right seat. At block in, the pilot's instruments read 145 knots and 7,000 feet, and still no off flags. The reason for no flags was that no mechanical failure had occurred, and the ailing CADC was still sending apparently valid electrical signals to the VASFI and the MADAR.

AIMS ITEM -- Another instrumentation snafu occurred in a C-130 during descent when the copilot's altimeter hung approximately 500 feet above the level-off altitude. While a knuckle knock dislodged the sticking needle in this case, a pilot determining his MDA from a high-reading instrument without cross-cockpit checks might have received a much harder rap.

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